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July, 1932

JAPANESE BEETLE AND ASIATIC BEETLE RESEARCH

Reduced dosage of hydrocyanic acid gas effective for fumigation of Japanese beetle in fruit cars.--J. W. Lipp, Moorestown, N. J., reports that "Three tests have been run with liquid hydrocyanic acid against the adult beetle at the rate of 2 ounces per 1,000 cubic feet, at temperatures of approximately 70°, 75°, and 80° F. A complete mortality was obtained with this dosage, the same rate recommended tentatively for refrigerator-car fumigation. On June 28 a test was run at Philadelphia, using 6 ounces of liquid hydrocyanic acid in a car approximately 2,400 cubic feet (including ice bunkers) in volume, which was loaded with bananas. One thousand beetles were distributed throughout the car before the hydrocyanic acid was applied. Twenty-four hours later all beetles were dead. The temperature inside the car dropped to 60° F. during the treatment. The results indicate that the dosage of 6 ounces of hydrocyanic acid per car for a period of two hours gives a complete mortality of the beetles."

Japanese beetle larvae found feeding on strawberry.--According to F. E. Baker, Moorestown, "damage to strawberry plants caused by larval feeding was reported to the laboratory. The injury was reported from Vineland and Mercerville, N. J. It was first observed when dead and wilted plants began to show up in the beds, along with a decreased yield of fruit. Upon further examination by digging up several plants, it was found that the roots had been injured. Inasmuch as several Japanese beetle larvae were found feeding under the plants, the injury was immediately attributed to them. It is planned to test the effect of lead arsenate applied to the soil to kill the grubs."

Reaction of potted perennials to lead arsenate treatment for beetle grubs.--On June 2 W. E. Fleming and F. E. Baker made an examination " of the perennials potted last year in soil containing lead arsenate at the rate of 1,500 pounds per acre to a depth of 3 inches. This examination was made only on the appearance of the tops and did not take into consideration the condition of the roots. \* \* \* The following varieties of perennials appear to be as good in the treated as in the untreated soil:

Ajuga reptans, Amsonia tabernaemontana, Aster novae-angliae, Calimeris incisa, Centaurea dealbata, Centranthus ruber, Chelone glabra

alba, Coreopsis lanceolata, Dianthus deltoides, Eryngium planum, Eupatorium urticaefolium, Gaillardia aristata, Hemerocallis dumortieri, Hosta lancifolia, Hypericum moserianum, Iberis sempervirens, Kniphofia uvaria, Lychnis chalcedonica, Lychnis coronaria alba, Lythrum salicaria, Monarda didyma, Nierembergia rivularis, Pentstemon torreyi, Physalis francheti, Polemonium reptans, Saponaria ocymoides, Silene schafta, Solidago canadensis, Stachys grandiflora superba, Thalictrum glaucum, Tunica saxifraga, Valeriana officinalis, Vinca minor

The following varieties have been definitely retarded: Achillea ptarmica, Aquilegia chrysantha, Arenaria montana, Chrysanthemum maximum, Dicentra formosa, Digitalis lanata, Echinops ritro, Gypsophila repens, Helenium hoopesi, Heliopsis helianthoides, Limonium latifolium, Physostegia virginiana, Rudbeckia maxima, Senecio pulcher, Stokesia laevis cyanea.

The following varieties were killed when potted in soil treated with lead arsenate and were discarded immediately after the observations made on October 6, 1931: Astilbe davidi (hybrid), Baptisia australis, Cactus (hardy, mixed), Clematis heracleaeifolia davidiana, Eri-geron elatior antwerpia, Geum chiloense, Potentilla nepalensis, Sedum spectabile, Veronica repens, Tritonia aurantiaca."

#### TRUCK CROP AND GARDEN INSECTS

Fertilizers have no effect on wireworm injury.--F. H. Shirck and assistants conducted "An experiment (at Parma, Idaho) to study any possible effects that commercial fertilizers or barnyard manure may exert on wireworms. The following fertilizers were used: Ammonium sulphate, muriate of potash, treble phosphate, complete fertilizer, formula 3-19-10, stable manure, fish meal, and bone meal. The commercial fertilizers were applied at acre rates of 250 pounds, 500 pounds, and 750 pounds, each fertilizer being used three times at each rate. Corn was the crop used. About 90 per cent of the corn was killed by wireworms, either before germination or soon after. Our population counts had indicated populations of 2 wireworms per square foot. There seemed to be no evidence that any of the fertilizers used affected the wireworms or reduced the damage done by them."

Oviposition of trapped females of Pheletes californicus Mann.--M. W. Stone, of the soil insects laboratory at Alhambra, Calif., reports that 77 females of P. californicus taken at random from adults collected in the field and placed in salve cans "deposited 8,778 eggs, or an average of 114 eggs per female; 535 eggs were recovered by dissection; females averaged 24.4 days alive, beginning with their confinement in salve cans; the average number of days from capture to begin-ning of egg deposition was 3.6 days."

A strain of alfalfa apparently toxic to pea aphid.--Reporting on life-history studies of the pea aphid (Illinoia pisi Kalt.) on potted alfalfa and potted peas in an out-door insectary at Madison, Wis., John E. Dudley, jr., says: "Of the two hundred and odd alfalfa plants used in these experiments, three have been discovered which apparently are toxic to aphids, or at least upon which aphids refuse to feed. Hundreds of aphids, both young and adult, have been placed on two of these plants over a period of a month, and in all cases they have been found dead in from 1 day to 3 days. There is no apparent outward condition that would differentiate these plants from any others but they will not support aphids. They are to be propagated and the increased plants, if still resistant to aphid attack, will be analyzed for nutritive value as hay."

Survival of Mexican bean beetle.--H. C. Mason, who is engaged in bean insect investigations at Columbus, Ohio, gives the percentage of survival of Epilachna corrupta Muls. "as obtained from hibernation cages at Athens, Ohio, Columbus, Ohio, and Arlington Farm, Virginia." The minimum emergence was 15.60 per cent at Columbus; at Athens the maximum emergence was 32.11 per cent; while at Arlington, Va., the emergence was 43.83 per cent, the peak of emergence being on June 13 at that place.

Coccinellids destroy eggs of bean beetle.--Neale F. Howard, Columbus, Ohio, reports that "Notwithstanding the largest population of adults that has probably occurred in southern Ohio for many years, the beetle has not reproduced as rapidly as was expected. \* \* \*. The reason for the lighter larval infestation than the number of adults present would indicate is owing, partially at least, to the feeding on the eggs by native coccinellids, chiefly Ceratomegilla fuscilabris (Muls.) and Hippodamia convergens Guer. Field counts show that approximately 14 per cent of the eggs gave evidence of having been chewed by a coccinellid."

Activity of bean stalk weevil.--J. R. Douglass, Estancia, N. Mex., reports that Sternus paludatus (Casey) "is more abundant and destructive in the foothill canyon fields than heretofore. \* \* \*. Emergence from hibernation was concluded on June 11, with the following results:" Emergence from oak leaves and pine needles, associated with pine, 28.9 to 44.3 per cent; from pinon and cedar needles, associated with pinon-juniper, 27.6 per cent; and from oak leaves and pine needles, associated with short-grass or semidesert, 60.4 per cent.

#### FOREST INSECTS

Early in June the forest insects laboratory located at Amherst, Mass., was moved with the Northeastern Forest Experiment Station to 335 Prospect Street, New Haven, Conn.

Locust borer shows no crown-class preference for oviposition.--Ralph C. Hall, Columbus, Ohio, reporting on a reexamination of perma-

nent sample plots established in 1931, says: "These plots have been well distributed over the States of Ohio and Indiana, and an attempt was made to include all age classes and both badly infested and immune plantations. It appears from the results of these examinations that the locust borer shows no definite preference for trees upon which to oviposit, in any one crown class; 199 dominant trees examined had a total of 2,986 larvae, or an average of 15 larvae per tree; 403 codominant trees examined had a total of 9,175 larvae, or an average of 23 larvae per tree; 336 intermediate trees had a total of 6,093 larvae, or an average of 18 per tree; and 200 overtopped trees had a total of 3,006 larvae, or an average of 15 larvae per tree."

Buoyancy of suspended gipsy moth larvae.--W. L. Baker, Melrose Highlands, Mass., who is engaged in a study of the buoyancy of first-instar gipsy moth larvae, says, "from the studies thus far made it is seen that such (suspended) larvae are extremely buoyant. When larvae are hanging, suspended by a thread of silk, in a 2.5 miles per hour breeze, they are blown and held practically parallel with the direction of the current of air. When the larvae are allowed to fall into this column of moving air (2-1/2 miles per hour) they fall almost perpendicularly through it. They are deflected from a straight drop by not more than 20°. Thus it is seen that even a very short piece of silk when attached to a larva adds tremendously to its buoyancy."

Coccinellid feeds on beech scale.--Concerning observations made at Manchester, Mass., on June 4, R. C. Brown notes that "adults of the coccinellid Chilocorus bivulnerus Muls. were fairly abundant. They were feeding on the scale (Cryptococcus fagi Baer.). Counts on the trunks of trees up to 15 feet showed 27, 24, 21, 9, and 6 beetles on five trees. Beetles were taken to the laboratory and were found to feed on the scale, completely cleaning the bark of this coccid. Larvae of different instars of C. bivulnerus were feeding on the scale. Observations made thus far on the natural enemies of the scale indicate that C. bivulnerus is the only predator that may prove to be important. At Manchester they are, however, hardly abundant enough to exert an appreciable controlling effect."

Compsilura concinnata Meig. shipped to Barbados.--J. A. Millar, Melrose Highlands, reports "the shipment on June 30 to R. W. E. Tucker, Department of Agriculture, Barbados, B. W. I., of 1,500 Compsilura concinnata puparia obtained from satin moth larvae collected in Taunton, Mass. Mr. Tucker requested that puparia of this fly be sent him, with the idea that the species might establish itself in Barbados as an enemy of certain army worms and cutworms."

Burning with fuel oil effective against mountain pine beetle.--W. J. Buckhorn and F. P. Keen, Portland, Oreg., report on a method of burning trees with fuel oil, as follows: "First the trees were felled, limbed, and the slash cleared away from the logs; then a fire was started

and carried along the logs by spraying on fuel oil from a back pump. From one-half to three-quarters of a gallon of oil was sufficient for the average-sized tree. A good kill of brood was secured and it was found that with certain precautions the method could be used in very hazardous areas. In more open areas the infested trees were decked and burned. The cost of the method is only slightly more than of the sun-curing method."

Seasonal history of pine beetles.--"Seasonal history records of *Ips confusus* Lec. and *Dendroctonus brevicomis* Lec. were kept during the month by R. L. Furniss near Bass Lake," reports J. M. Miller, Berkeley, Calif. "At elevations between 3,000 and 4,000 feet two seasonal generations of *Ips* had been completed by June 30 and the third generation was in progress. Emergence from the earliest of the first seasonal generations of *Dendroctonus brevicomis* was occurring by June 25 and attacks of the second seasonal generation were in progress. However, for the greater part of the infestation above 4,000 feet elevation the first generation had not emerged by the end of June."

Penetrative oils retard development of pine beetle.--Mr. Miller also reports that "Experiments in the use of penetrative oils on bark infested by the western pine beetle, as a means of treating infested trees during the summer period when burning is impracticable, were conducted at the Bass Lake base in cooperation with Mr. Gay of the Standard Oil Research Laboratory. Only a few of the oils tried so far have shown effectiveness. It was found, however, that some of the lighter mineral oils, when applied to the outer bark on the tree, work through the ventilation holes into the egg galleries and eventually reach the larvae in the larval mines. The first effect of the oil is not toxic, but striking retardation of the brood development was observed. In several tests practically all the brood died after remaining in this retarded condition for about two and one-half months."

#### CEREAL AND FORAGE INSECTS

Collecting of corn borer parasites in the Orient suspended.--In conformance with a more economical plan of operation in the corn borer research work, it was decided to suspend for the present the work of collection and shipment of corn borer parasites from the Orient. In accordance with this decision the laboratory formerly operated at Kobe, Japan, was closed early in June and C. A. Clark, who was in charge, came to America, arriving at Arlington, Mass., on June 23.

The western spotted cucumber beetle in relation to sweet corn in Oregon.--T. R. Chamberlin, Forest Grove, Oreg., reports: "Adults of the new generation (those which came from the eggs of overwintering beetles) were first found near McMinnville on June 24. They were common in the fields on June 27. Issuance this year was approximately 1 week later than last year. A field of sweet corn that had been injured by larvae of *Diabrotica soror* Lec. was seen on June 11. It was estimated that

10 per cent of the plants in the whole field were injured, although some parts of the field showed 50 per cent injured. The field of several acres was on gently rolling land which is subject to winter and early spring overflow from the Tualatin River. In the western half of the field, where most of the injury occurred, the corn was planted early in May, but the eastern and little injured part was planted later. When the field was plowed late in the spring it was covered with a heavy growth of weeds in which the beetles had apparently oviposited heavily and the resultant larvae had transferred to the corn after the weeds were killed. The larvae found in the field on the 11th were practically full grown and most of the feeding was over. It appeared that the late-planted corn had been subjected to less feeding than the earlier planted and was less injured. The location of the field on land that remained moist late in the season, in addition to the cool moist spring of 1932, apparently had favored the pest, as this type of injury has been unusual in our locality."

Stages of alfalfa weevil in San Joaquin Valley.--R. A. Blanchard, who made three weekly observations in June on Hypera postica Gyll. near Pleasanton, in the San Joaquin Valley of California, says: "On June 2, larvae of all stages, as well as cocoons and adults, were present. On June 18, the adult stage was the most prevalent with only an occasional larva and cocoon being noticed. One egg mass was found inside a green stem on June 18. Considerable search for parasites did not reveal any."

Unusual conditions increase injury by alfalfa weevil in Nevada.--According to S. J. Snow, "The increase in the number of larvae and the injury continued during the first 10 days or two weeks of June and most of the fields in the vicinity of Fallon became heavily infested, and, except for remedial treatment by the common practice of dusting, would have been badly damaged. The cool and storm periods occurring throughout the spring and into June delayed the hatching of eggs and the maturing of the larvae and gave the appearance of repeated hatchings and attacks. \* \* \* This prolongation of the weevil attack increased the injured area by a few thousand acres, making in all an estimated area of 8,000 to 10,000 acres that should have been dusted. More than 5,000 acres were dusted, mostly with the horse-drawn traction machines."

Food increases longevity of range caterpillar parasite.--O. M. Barnes, Tempe, Ariz., submits the following report on preliminary food tests with adult females of Anastatus semiflavidus Gahan: "A preliminary series of tests to determine what effect the presence of honey water (1-to-4) solution, tap water, and Hemileuca oliviae (the host) eggs have upon the length of life of unmated Anastatus semiflavidus females has been completed. Forty-nine to 75 A. semiflavidus females were used in each test. The honey water and tap water were supplied on cotton plugs; the H. oliviae eggs on grass stems. The tests were carried on during the period from January to June, 1932, in a temperature control

room at a practically constant temperature of approximately 75° F. Apparently, honey water as food greatly lengthens the life of Anastatus semiflavidus; water alone increases length of life materially, but the presence of H. oliviae eggs either alone or with water or honey water influences the length of life but little, if at all."

Alfalfa seed chalcis reared from loco weed.--"During the last week in May a trip was made by E. E. Russell, of the Tempe, Ariz., laboratory, into northern Arizona in company with A. B. Ballantine, of the University of Arizona Extension Service, in order to make a survey of the insect life attacking the loco weed. It was found that the species of loco of greatest concern to the ranchers in the area visited is what is spoken of as blue loco (Astragalus diphysus). Large seed pods, roots, and stems were collected from the localities visited. \* \* \* 4 species of lepidopterous larvae from roots and stems; 2 species of Coleoptera; and 5 species of Hymenoptera, including Bruchophagus funebris How. and two of its most important parasites."

"Stubbled in" grain fields a source of grasshoppers.--According to R. L. Shotwell, Bozeman, Mont., "Small grain fields, especially barley fields of last year when stubbled into crop this spring, yielded an abundance of hoppers over the whole field. In this same type of field when well worked last fall and sowed to winter wheat, there were no hoppers this spring, indicating that cultural methods applied in the fall are a check to infestation. Corn land is worked in the spring on grain stubble left over the winter. These stubble fields produced abundance of hoppers this spring. When listed to corn, many were destroyed and the rest migrated to the edges of the field, where they were easily poisoned."

#### COTTON INSECTS

Baled alfalfa hay may carry pink bollworm.--"An experiment was planned," report D. A. Isler, and A. J. Chapman, Presidio, Tex., "to study the possibility of cotton bolls being raked up and baled with the hay when an old cotton field is planted to alfalfa, and to determine the rate of mortality and length of time long-cycle larvae remain in old bolls in an alfalfa field. On February 8 and 9 several bags of bolls, with an approximate infestation of 1.13 worms per boll, were distributed over about one-quarter acre of soil. The plot was then disk harrowed, alfalfa seed sown and covered by the use of a peg-tooth harrow, and an irrigation given. On May 3 an examination of 100 bolls taken from the surface of the soil showed 87 live larvae. The alfalfa was cut on May 4 and raked on May 5. From 2,125 pounds of hay, 291 bolls that had been raked up with the hay were collected. The examination of these bolls showed 97 live larvae. From these observations it is evident that there is considerable danger of reinestation from old cotton fields seeded to alfalfa." The studies to determine larval survival in such bales have not been completed but indicate survival for several weeks.

Boll weevil hibernation results.--G. L. Smith and assistants, Tallulah, La., report as follows: "The emerging boll weevils were removed daily from the 70 hibernation cages during June. The peak of emergence occurred between June 1 and June 15 in the 60 cages located in the open field on the laboratory grounds, but the peak was reached between June 15 and June 30 in the 10 cages located in the timber; 10.27 per cent of all the weevils emerged during May and 7.94 per cent during June. However, 6.77 per cent emerged between June 1 and June 15, and only 1.17 per cent from June 15 to June 30. The total emergence during May and June was 18.21 per cent. \* \* \* There was a little higher emergence from the Spanish moss than from cornstalks in the October 15 installation, but the emergence was somewhat higher from the cornstalk shelter in the October 31 and November 14 installations. \* \* \* It is also apparent that the total emergence of weevils from both shelters for the three installation dates (October 15, October 31, and November 14) was 12 per cent, 17.79 per cent, and 26.23 per cent, respectively. Comparing Spanish moss with leafage as shelter, the cages being located in timber, the emergence was much higher from the leafage shelter, the moss running lower than in the open field cages. The peak of emergence was 15 days later in the timber cages than in the open field cages."

#### INSECTS AFFECTING MAN AND ANIMALS

Sand-fly laboratory moved.--W. E. Dove reports that the field laboratory which has been located at Charleston, S. C., was moved at the close of the fiscal year to the new Post Office Building at Savannah, Ga.

Habits of larvae of the throat botfly.--E. F. Knipling, Galesburg, Ill., reports as follows on the habits of ingress of newly hatched larvae of Gastrophilus nasalis L.: "Repeating tests made last summer, 30 newly hatched larvae were placed under the jaw of a horse, on the hair, about 8 inches above the mouth. They immediately disappeared among the hair. Within 10 minutes they began to appear in the short hair around the lower part of the jaw and within 15 minutes some were entering the mouth; 9 of them were observed to reach the mouth; and 4 of them dropped to the ground. These larvae were extracted from well-incubated eggs and it is likely that some were below normal in vitality. None appeared to make any attempt to penetrate the skin. To determine that they invariably migrate downward instead of upward, we placed 16 such larvae on the neck of the horse, just above the breast. Above and below this location we had clipped short the hair in narrow horizontal strips so that we could observe the larvae crossing. Within a minute or two they began to cross the lower clipped strip until we had counted 10. None appeared in the upper strip and none appeared to try penetration. We conclude that this species normally migrates from the egg downward to and into the mouth."

### STORED PRODUCT INSECTS

Cooperative experiments in fumigation of tobacco warehouses.--A series of fumigations of tobacco warehouses in cooperation with private firms at their expense and at their request have been conducted by W. D. Reed and assistants, Richmond, Va., for the control of the tobacco moth (Ephestia elutella Hbn.) and the cigarette beetle (Lasioderma serricorne Fab.) Mr. Reed reports: "On June 1 and 2 we supervised the fumigation of 1,390,080 cubic feet of tobacco warehouses in cooperation with one company, and 5,605,195 cubic feet in cooperation with another company. The warehouses were ventilated on June 5 and the test lots of insects removed on the day following. \* \* \* These warehouses were again fumigated on June 28 and 29 and will be ventilated on July 4. \* \* \* On June 15 we cooperated in the fumigation of 4,300,000 pounds of flue-cured tobacco and also in the fumigation of 800,000 pounds. Apparently good results were obtained using dosages of 16 and 20 ounces of liquid hydrocyanic acid per 1,000 cubic feet. \* \* \* On June 16 we cooperated in the fumigation of more than 8,000,000 pounds of imported tobaccos in Winston-Salem, N. C. A dosage of 16 ounces of liquid hydrocyanic acid per 1,000 cubic feet was applied and apparently good results were obtained. On June 17 we supervised the fumigation of 725,000 pounds of flue-cured tobacco in Washington, N. C. A dosage of 2 1/2 pounds of sodium cyanide per 1,000 cubic feet was applied according to the formula 1-1 1/2-2; fifteen wooden barrels of 50 gallons capacity were used to generate the hydrocyanic acid gas; each barrel contained a charge of 20 pounds of sodium cyanide."

Ground cloths for spreading under fig trees.--Perez Simmons, Fresno, Calif., reports: "A group of 10 trees of the Adriatic variety, located in the Forkner fig tract, were measured for ground cloths. \* \* \* A random sample of 22 Adriatic trees at Lone Star, measured May 11, ranged from 9 to 27 feet in spread. The same number of Mission trees at Lone Star spread from 12 to 34 feet. These figures show the range in size of fig trees in orchard plantings and the probable necessity for ground cloths of different sizes. Widths of 6 and 9 feet are proposed for use in our experiment, as tobacco shade cloth is obtainable in widths of 3 feet or multiples thereof."

Pea weevils active at Moscow, Idaho.--Tom Brindley reports that "The pea-growing section of the Palouse area of Idaho and Washington is experiencing one of the worst weevil years in the history of the industry in this section. The weevils are so numerous in the vicinity of Moscow Mountain that almost all of the early planted fields will be practically a total loss. The weevils began leaving their overwintering quarters during the second week in May. The first weevils were found on volunteer peas on May 11 and by June 6 the numbers had reached a point where 9 weevils could be collected in 100 sweeps of a net. On June 11 a maximum of 1,123 weevils were collected in 100 sweeps. On planted peas the first weevils were collected on June 3. In one planted field the numbers increased from a maximum of 4 weevils per 100 sweeps on June 7 to 206 weevils on June 10 and to 1,418 on June 18. Collections of this kind have

been made on 12 volunteer patches and on 7 regular planted fields. \* \* \* Eggs were found on June 7 and the peak of egg deposition was reached on June 22. The first eggs laid hatched on June 18. In one badly infested experimental plot a maximum of 116 eggs were found on one pod."

Hatching period of pea-weevil eggs in Oregon.--A. O. Larson, Corvallis, Oreg., reports that "During the month (June) a few pods were tagged each morning and the eggs on these pods were rubbed off. Then the eggs laid during that day were marked the next morning by making a circle around them with India ink. They were examined later to determine when the black heads of the larvae appeared and when they hatched. In May about 25 pods were tagged in this manner and in June more than 200. The time required for the eggs to hatch varies greatly with the weather. Eggs laid on May 14 hatched in from 22 to 24 days; eggs laid on June 6 hatched in 8 days; many of the eggs laid on June 24 hatched in 7 days. Most of the eggs laid during the month required about 9 days to hatch. When, as often happens, two eggs are laid at a time, one on top of the other, the lower egg invariably develops first. \* \* \* In May we found that eggs were developed only after the females came out of hibernation and began to feed in the spring. In the cages it was at least 9 days before they began to lay eggs after they were given pea blossoms as food. This agrees with our field notes."

#### TOXICOLOGY AND PHYSIOLOGY OF INSECTS

Paris green toxic to mosquito larvae below water surface.--"A statement is made in the literature," says M. C. Swingle, Takoma Park, Md. "that Paris green loses its toxic value for mosquito larvae if it becomes wet and no longer floats. This would be a serious charge if true, as such wetting would be sure to follow storms or unusual disturbances in the water. A sample of Paris green was therefore tested to determine this fact. A set-up was used that confined all the green to the bottom of the test tube and made it impossible for any solid arsenical to be present on the surface. All of the larvae were killed in a short time, thus proving that Paris green is toxic when wet and lying on the bottom of a pond."

#### BEE CULTURE

Wintering bees in the white clover region.--Geo. E. Marvin's study of the data obtained in the White Clover Region (parts of Minnesota, Michigan, Iowa, and Ohio) on the cost of honey production reveals some unusually good information. It was found, for instance, that 33.3 per cent of the collaborators reported cellar wintering and out of 2,174 colonies wintered in the cellar 7.2 per cent died. Of the total number of the beekeepers reporting, 24.3 per cent wintered their bees out of doors in cases, with a loss of 4.5 per cent out of 2,362 colonies; and 42.4 per cent of the beekeepers wintered out of doors by wrapping the colonies in tar paper, with a loss out of 2,282 colonies of 3.5 per cent. Costs

of the various types of wintering gave the following figures per colony: Cellar - 27 cents; packing cases - 39.1 cents; wrapped in tar paper - 31.7 cents.

Anesthetics for bees.—A. P. Sturtevant, of the Intermountain States Field Laboratory, Laramie, Wyo., reports that "The need for anesthetizing bees arises frequently in apicultural research. Some of the work at this laboratory requires such a treatment of bees and it is desired that injury to the treated bees be avoided, both from the standpoint of longevity of life and their normal behavior. Farrar used hydrocyanic acid gas generated from calcium cyanide while at Massachusetts, and Hambleton secured excellent results with carbon dioxide in work at Washington. A number of tests of these 2 gases were planned by C. L. Farrar and W. C. Northrup to determine the advantages and the effects on treated bees. A series of 22 cages containing 20 bees each, obtained from the brood nest of a normal colony, was started on June 8 and was run for the rest of the month. They were divided into 2 sets, one being exposed to light and the other kept in the dark. Both were subject to fluctuations of laboratory temperatures, approximately 70° to 80° F. Each series contained a control cage untreated; one gassed with hydrocyanic acid gas just until bees dropped as if dead; one gassed with carbon dioxide until the bees dropped; and one, each, respectively, for an additional exposure to carbon dioxide after the bees had dropped as follows: 1, 2, 3, 4, 5, 6, 8, and 10 minutes. \* \* \* No evident injury can be seen in the cage experiments from the use of either hydrocyanic acid gas or carbon dioxide as anesthetics, carbon dioxide being used up to a 10-minute exposure after the bees are first rendered inactive. \* \* \* Hydrocyanic acid gas has the advantage of being easier to use and it renders the bees quiet enough for samples of 500 to 700 bees to be weighed and counted before they revive. The chief objection to its use is prejudice against the use of a strong poison. The above results are almost identical with several series of cage tests using hydrocyanic acid gas in Massachusetts. Carbon dioxide will not render the bees inactive long enough for weighing a sizable sample and it is necessary to continue gassing in order to keep them quiet."

#### FRUIT AND SHADE TREE INSECTS

Population of Mediterranean fruit fly affected by rainfall.—Reporting on population studies to determine the effects of environmental factors, A. C. Mason, Honolulu, T. H., says: "Adult flies are almost entirely absent now in the guava plots, the traps yielding only a very few flies during the past month, at any of the three plots under observation. \* \* \* During the same period last year considerably less rainfall occurred, and more flies were recovered, even though the same host conditions occurred. This indicates that rainfall has a considerable influence on fruit-fly population."

Fruit-fly larvae live three days in sea water.--In the March, 1932, Monthly Letter reference was made to experiments to determine the lethal effect of sea water on larvae infesting kamani nuts, oranges, and guava at Honolulu. R. H. Marlowe now reports that "300 Manila mangoes, containing approximately 3,258 larvae were used. \* \* \* It was found that the mortality of the larvae in fruits 24 hours in sea water was 97.1 per cent; for 48 hours, 99.6 per cent; and it was necessary for the mangoes to be in the sea 72 hours or more for 100 per cent kill to be obtained."

Phylloxera on pecan yield to spray treatments.--The first season's experiments conducted by Howard Baker, Shreveport, La., in the control of two species of phylloxera on pecan in southern Louisiana have given very encouraging results, which are summarized in the following table:

Treatment	Period of appli- cation	Reduction in infestation		
		<u>P. devastatrix</u> Perg. on Schley variety at		<u>P. notabilis</u> Perg. on Pabst variety, at Whiteville, La. Per cent
		Whiteville, La.	New Iberia, La.	
		Per cent	Per cent	Per cent
Lubricating-oil emulsion 3 per cent.....	Dormant	74	93	29
Liquid lime-sulphur 1 to 8	"	91	--	95
Liquid lime-sulphur 1 to 8, plus nicotine sulphate 1 to 800.....	"	97	98	85
Lubricating-oil emulsion 3 per cent.....	"Delayed dormant"	67	90	83
Lubricating-oil emulsion 3 per cent plus nicotine sulphate 1 to 800.....	"	96	97	96
Liquid lime-sulphur 1 1/4 to 50, plus nicotine sulphate 1 to 800.....	"	94	98	93
Nicotine sulphate 1 to 800, plus potash fish-oil soap 2 pounds in 50 gallons.....	"	96	94	88
Unsprayed--(galls per twig)		6.7	24.4	1.4